

TWO NEW SPECIES OF *LIATRIS* SERIES *GRAMINIFOLIAE*
(ASTERACEAE: EUPATORIEAE) FROM THE
SOUTHEASTERN UNITED STATES

Robert Kral and Guy L. Nesom

Botanical Research Institute of Texas
509 Pecan Street
Fort Worth, TX 76102-4060, U.S.A.

ABSTRACT

Two species of *Liatris* series *Graminifoliae* are described for the first time and illustrations and distribution maps are provided for both. ***Liatris savannensis*** Kral & Nesom, sp. nov., is similar to *L. graminifolia* but differs in its larger heads with more numerous florets and broader, erose-lacerate phyllary margins. It occurs on the western coast of peninsular Florida, south of the known range of *L. graminifolia*. ***Liatris patens*** Nesom & Kral, sp. nov., is similar to *L. gracilis* in its consistently pedunculate heads and hirtellous-strigose stems and peduncles but differs in longer peduncles and larger heads with more numerous florets; it is similar to *L. graminifolia* in head size and number of florets but differs in its hairy stems and peduncles and longer peduncles. *Liatris patens* occurs in southeastern Georgia and adjacent South Carolina, where it apparently is allopatric in range with its close relatives *L. graminifolia* and *L. gracilis*.

RESUMEN

Se describen por primera vez dos especies de *Liatris* serie *Graminifoliae* y se aportan ilustraciones y mapas de distribución para ambas. ***Liatris savannensis*** Kral & Nesom, sp. nov., es similar a *L. graminifolia* pero se diferencia por sus cabezuelas más grandes con flósculos más numerosos y márgenes de los filarios más anchos y lacerados. Aparece en la costa oeste de la península de Florida, al sur del área conocida de *L. graminifolia*. ***Liatris patens*** Nesom & Kral, sp. nov., es similar a *L. gracilis* por sus cabezuelas pedunculadas, y tallos y pedúnculos hirto-estrigosos pero se diferencia por tener pedúnculos más largos y cabezuelas más grandes con muchos más flósculos; es similar a *L. graminifolia* por el tamaño de las cabezuelas y número de flósculos pero se diferencia por sus tallos pelosos, y pedúnculos pelosos y más largos. *Liatris patens* aparece en el sureste de Georgia y parte adyacente de Carolina del Sur, donde aparentemente es alopátrica con sus parientes cercanos *L. graminifolia* y *L. gracilis*.

The species of *Liatris* series *Graminifoliae* (Gaiser 1946) are characterized by a pappus of barbellate bristles, corolla tubes pilose within, phyllaries nearly flat to rounded, obtuse, or acute at the apex, and sessile or pedunculate heads with 3-17(-20) florets. Gaiser recognized five species in series *Graminifoliae*: *L. graminifolia* Willd., *L. helleri* Porter, *L. gracilis* Pursh, *L. regimontis* (Small) K. Schum., and *L. turgida* Gaiser. Stucky (1991, 1992) and Stucky and Pyne (1990) recently clarified concepts related to several related taxa, reviving use of the name *L. virgata* Nutt. (to include *L. regimontis* and *L. graminifolia* var. *smallii* (Britt.) Fern. & Grisc.), and adding *L. cokeri* Pyne & Stucky to the group. *Liatris gholsonii* L. Anderson, an endemic of the Apalachicola River bluff system in

the Florida panhandle and close relative of *L. gracilis*, was recently described (Anderson 2002). The present study adds two more species to this group—the first endemic to a small region on the western coast of peninsular Florida, the second known from a broader area of southeastern Georgia.

In the fall of 1964, during a field study of slash pine-sabal palmetto savanna adjacent to brackish marshland in the vicinity of Punta Gorda, Florida, the first author collected an unusual *Liatris*. Additional collections were made from other sites in two adjacent counties over the course of the next 15 years, but a final determination of its identity was not made and other work intervened. After 40 years, its description is presented here.

Liatris savannensis Kral & Nesom, sp. nov. (**Fig. 1, 3**). TYPE: UNITED STATES. FLORIDA. Charlotte Co.: wet pine/cabbage palm flats, ca. 3 mi S of Punta Gorda, 7 Oct 1979, R. Kral 64559 (HOLOTYPE: US; ISOTYPES: FSU, NY, VDB, VSC).

Liatris graminifoliae similis, sed capitulis majoribus flosculis numerosioribus et phyllariis marginibus latioribus erosi-laceratis differt; *L. spicatae* similis sed differt caulibus glandulosis, foliis manifeste punctatis marginibus ciliatis, et tubis corollarum interne pilosis.

Plants perennials, corms ranging from globose to irregularly cylindrical, narrowly ovoid, or fusiform and caudex-like. Stems stiffly erect, (80-)90-130 cm tall, simple or (rarely) ascending-branched, terete, irregularly multicostate and shallowly grooved, glabrous but (including inflorescence axis) often sparsely but evidently sessile-glandular. Leaves in high spiral, the oldest approximate, mostly broken away by anthesis, but, if present, elongate (-30 cm), essentially narrowly linear-lorate, those immediately above on stout internodes to 5 cm or more, pandurate, gladiate-lorate, (17-)20-40 cm long, with broad, clasping-based, intermittently pilose-ciliate petiole bases, gradually narrowed, then dilating to linear-elliptic, linear-spatulate or linear oblanceolate blades 3-10 mm wide, the petiolar nerves convergent to few laterals (ultimately no laterals), the median nerve broad, sulcate or compound, apex variously acute, callused, margin entire, slightly thickened, surfaces pale green with darker glandular punctation, glabrous except for some intermittent pilosity along abaxial midrib; upstem leaves gradually shortening, narrowing in tighter spiral, sessile, mostly ascending, proximally pilose-ciliate, transitional to inflorescence bracts, the lowermost exceeding, the uppermost exceeded by, heads. Inflorescence mostly determinate, spiciform, rarely branched, its axis typically at least as long as the leafy part of the plant, the heads sessile or on peduncles mostly 1-2 mm long. Heads spreading-ascending, turbinate-campanulate; involucre just past anthesis (7-)8-10 mm high from base to involucre apex, (8-)9-11(-12) mm wide (pressed); phyllaries ciliate, in (3-)4(-5) series, the lowermost shortest, 1.5-3 mm, ovate to oblong, fleshiest, greenish, glandular-punctate, 3-nerved, progressively longer inward, 4-6 mm, becoming obovate, then spatulate 7-9(-10) mm, apically broadly rounded, with a hyaline, pinkish-purple, erose to lacerate bor-

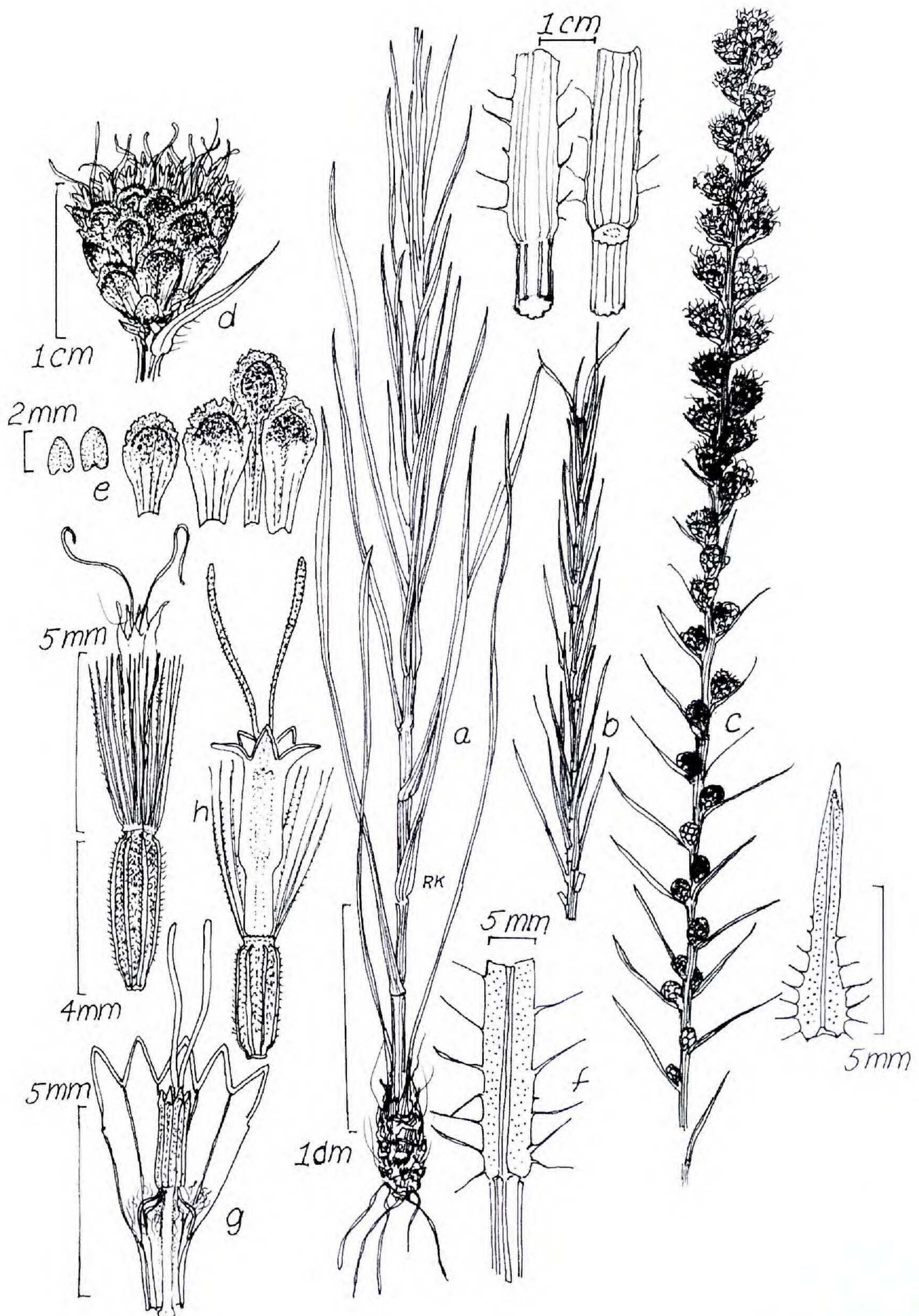


FIG. 1. *Liatris savannensis* (from the type). **a.** Habit, lower stem (at left); lower leaf base, abaxial (left) and adaxial (right) view. **b.** Midstem. **c.** Inflorescence (left), subtending bract, abaxial view (right). **d.** Head, with subtending bract. **e.** Phyllaries of a series from lowermost (left) to inner/uppermost (right). **f.** Base of midcauline leaf, abaxial side. **g.** Adaxial view of spread corolla. **h.** Fertilized floret (left); floret at anthesis (right).

der (0.2–)0.4–1 mm wide, intermittently ciliolate, the dorsal areas of longer bracts greenish to reddish-green or purple, distinctly glandular-punctate, with a sharp, low, rounded buttress delimiting the hyaline border. Florets 9–16(–17); corolla tubes at anthesis yellowish or pale with pinkish-purple lobes, sessile-glandular, tubular portion 5 mm, lobes 5, spreading, triangular, 2 mm long; internally pilose in the region of filament insertion with a broad annulus of whitish, crisped hairs. Achenes cylindric, base slightly narrowed, apex with a short neck at juncture with pappus rim, ca. 4 mm long, blackish, with ca. 10, paler, raised ribs, densely hirtellous on the ribs, sparsely so on the intervals; pappus mostly 5 mm long, bristles 30–40, pale purple-brown distally, strongly barbellate.

Etymology and habitat.—The epithet “savannensis” alludes to the savanna habitat of the species. The habitats are characterized as open sandy flats, usually moist or wet sites, dominated by slash pine, sabal palmetto, or a mixture of the two. Collections of flowering plants have been made mostly from mid-September through mid-October. Flowering less commonly may begin in August and extend into November.

Additional collections examined. **UNITED STATES. FLORIDA. Charlotte Co.:** S side of Punta Gorda on sandy peat of slash pine flatwoods bordering brackish marsh, 21 Sep 1964, *Kral 22919* (VDB, 2 duplicates distributed as *L. spicata*); sandy palmland by brackish marsh, E side of Punta Gorda, 21 Sep 1973, *Kral 51978* (FLAS, GH, MO, TEX, VDB); wet grassy clearings in pine-palmetto flats by US Hwy 41, 1 mi S of Punta Gorda, 7 Oct 1979, *Kral 64561* (FSU, GH, MICH, MO, NY, TEX, VDB); abundant in marshy lands, each side of RR tracks, within city limits, S side of Punta Gorda, 29 Sep 1961, *Lakela 24684* (BRIT, FLAS, USF). **Hillsborough Co.:** Hillsborough River State Park, 20 mi NE of Tampa on US 301, 18 Oct 1977, *Arcuri 587* (USF); along Fla. Hwy 581, ca. 5 mi N of Tampa, roadside, 6 Oct 1977, *Funk 48* (USF); along SR 581, ca. 5 mi N of Tampa, 6 Oct 1977, *Gregory 18* (USF); margin of flat, open pineland with scattered palmetto, N of Tampa Air Port, Kennedy Road, 13 Sep 1961, *Lakela 24637* (USF); flat pinelands and palmetto, and along boulevards NW of International Airport, Tampa, 24 Sep 1961, *Lakela 24670* (BRIT); margin of pineland and palmetto, along US 301, ca. 1 mi S of Hillsborough River State Park, NE of Tampa, 1 Oct 1963, *Lakela 26508* (FLAS, USF); frequent along SR-581, ca 5 mi N of Tampa, 6 Oct 1977, *Lindsey 30* (USF); Rocky Creek, disturbed site near Rocky Creek and Memorial Hwy, 7 Oct 1977, *Mortellaro and Giesy 169* (USF); disturbed area at edge of oak woodland along SR-581, ca. 5 mi N of Tampa, 6 Oct 1977, *Willett 32* (USF); flat ground edge of pine flatwoods, 5 mi N of Fletcher Avenue on 30th Street, Tampa, [Oct 1977], *Winkler 36* (USF); Flatwoods Park, 2.5 mi NW of Morris Bridge, ca. 7 mi E of Lutz, pine flatwoods, 22 Oct 1994, *Wunderlin 10618* (USF). **Lee Co.:** Business Rte. 41, N of Ft. Myers, in front of public library, pine woods, 7 Nov 1985, *Brown s.n.* (USF); [no specific locality], 1 Aug 1933, *Buswell s.n.* (USF). **Manatee Co.:** Bradenton, dry sand hills, Palma Sola, 19 Aug 1945, *Gaiser, Butts, and Arnold s.n.* (FLAS). **Sarasota Co.:** T. Mabry Carlton, Jr. Memorial Reserve, pine flatwoods between wet prairies, grassy area surrounded by saw palmetto, 13 Oct 1997, *Edmondson 97-34* (USF); T. Mabry Carlton, Jr. Memorial Reserve, disturbed edge parallel to So. FPL grade, 13 Oct 1997, *Edmondson 97-35* (USF); sandy peat of open pine-palm hammock at N side of Engelwood, 7 Oct 1979, *Kral 64571* (4 duplicates, to be distributed); sandy embankments marginal to flat pinelands, 10 mi S of Venice, US 41, with *Monarda*, *Coreopsis*, and *Rhus copallina*, 20 Sep 1961, *Lakela 24648* (FLAS, USF).

Two species of series *Graminifoliae* grow in the general area of *Liatris savannensis*. *Liatris gracilis* occurs throughout Florida but grows in distinctly

drier, sandier, more upland ecological systems; it differs from *L. savannensis* in its hairy stems and peduncles, smaller, consistently short-pedunculate heads, fewer florets per head (3–6(–7)), and shorter achenes. *Liatris graminifolia* is more similar to *L. savannensis* in vestiture and head size, but the geographic range of *L. graminifolia* apparently extends southward only to the vicinity of Levy County, apparently separated by roughly 150 kilometers from the nearest known population of *L. savannensis* in Hillsborough County.

Liatris savannensis closely resembles *L. spicata* (L.) Willd., which occurs throughout Florida, and has commonly been identified as such. The two are similar in their tall stems, narrow leaves, essentially glabrous vestiture, similar-sized heads in a spicate inflorescence, and phyllaries often with a broad, scarious, pinkish rim. The first author identified his initial collections as *L. spicata*, but in 1968, going back to the material and (finally!) opening a corolla, noted pilosity within it, an annulus of crisped hairs at the level of the filament bases. We follow Gaiser (1946) in weighting the presence of this pilosity as an indicator of relationship (Nesom in prep.), with the implication that *L. savannensis* is a member of series *Graminifoliae*, and observe that similarities between *L. savannensis* and *L. graminifolia* also are strong.

The following pair of couplets outline significant morphological differences first between *Liatris savannensis* and *L. spicata* and then between *L. savannensis* and *L. graminifolia*.

couplet 1:

1. Stems minutely sessile-glandular; leaves prominently punctate, proximal margins sparsely but distinctly ciliate with hairs 1–2.5 mm long; corolla tubes pilose within at the region of filament insertion; florets 9–16(–17) per head. _____ ***Liatris savannensis***
1. Stems eglandular; leaves not punctate or if so, then inconspicuously, margins eciliate or with a few scattered hairs 0.3–0.8 mm long; corolla tubes glabrous within; florets (5–)6–10(–14) per head. _____ ***Liatris spicata***

couplet 2:

1. Stems minutely sessile-glandular; involucre (7–)8–10 mm high, (8–)9–11(–12) mm wide; inner phyllaries spatulate, 3.5–4 mm wide, hyaline, distinctly erose to lacerate borders (0.2–)0.4–1 mm wide; florets 9–17 per head; achenes 4–4.5 mm long. _____ ***Liatris savannensis***
1. Stems eglandular; involucre 6–8(–9) mm high, 6–7.5 mm wide; inner phyllaries oblong to obovate or slightly spatulate, 1–2.2 mm wide, with hyaline, relatively smooth-edged borders 0.1–0.3 mm wide; florets 6–10 per head; achenes 3–4 mm long. _____ ***Liatris graminifolia***

Other differences exist between *Liatris savannensis* and *L. graminifolia* where comparisons are less diagnostic. Stems of *L. savannensis* range taller and leaves are longer. Corms of *L. savannensis* range from globose to elongate; we have observed only globose corms in *L. graminifolia*. The basal and lower cauline leaves of *L. savannensis* are essentially strap-shaped (lorate), usually with little increase in width distally, while similar leaves of *L. graminifolia* almost always

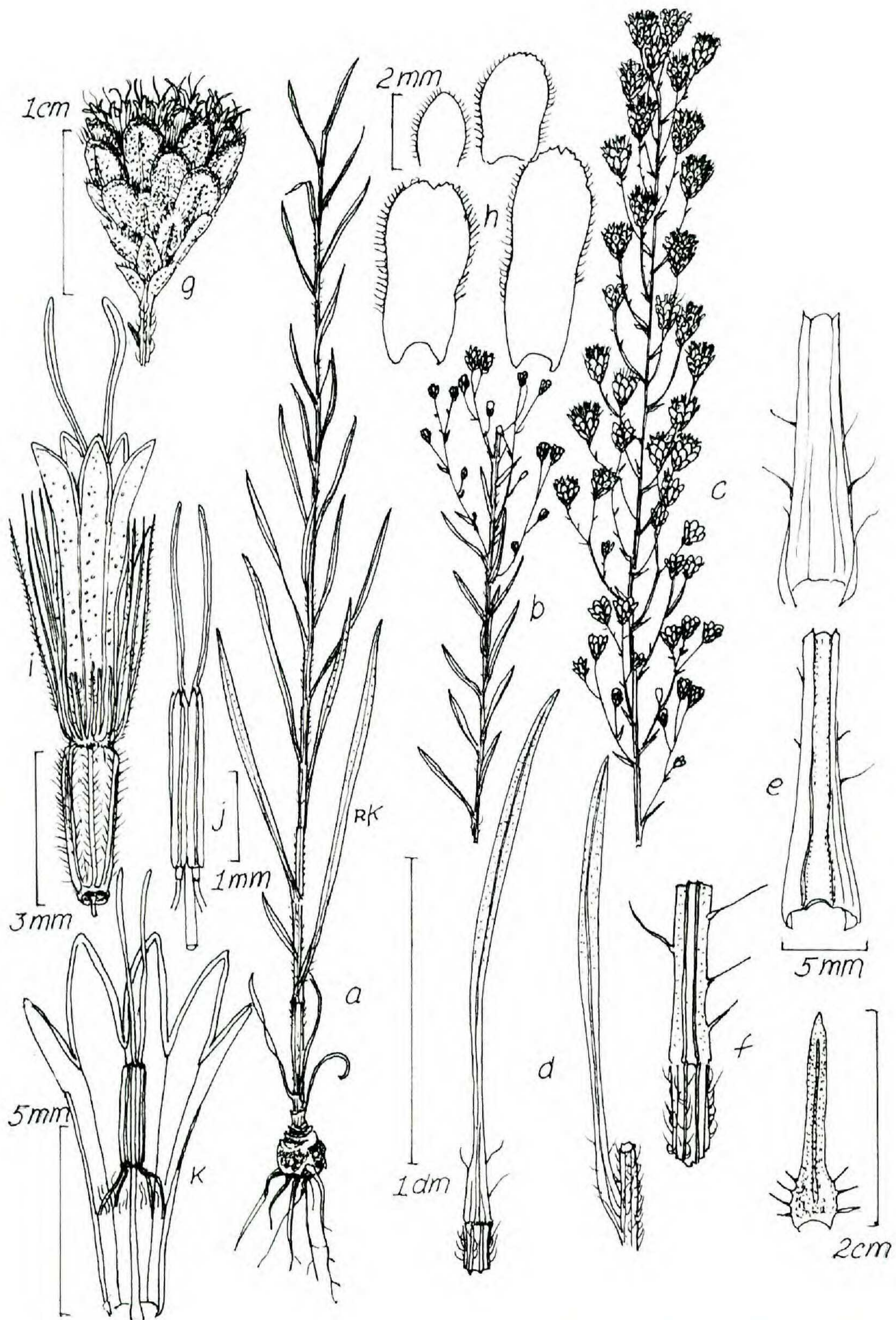


FIG. 2. *Liatris patens* (from Kral 56936). **a.** Habit, rootstock and lower half of plant. **b.** Upper leafy part of stem and inflorescence base. **c.** Middle and upper part of inflorescence. **d.** Basal leaf, abaxial view (left), adaxial view (right). **e.** Base of a basal leaf, abaxial side (below), adaxial side (above). **f.** Base of median cauline leaf, abaxial side (left), a lower bracteal leaf (right). **g.** Head in anthesis. **i.** A recently fertilized floret. **j.** Anther tube with exserted style branches. **k.** A spread mature corolla, inside view.

show a distinct petiolar portion in the lower 1/4–1/2 of the total leaf length, distinctly widening into a ‘blade’ portion. Heads of *L. savannensis* are consistently sessile or on shorter peduncles (peduncles 0–2 mm long) compared to slightly longer ones, on average, in *L. graminifolia* (peduncles 0–3(–7) mm long). In addition to differences in overall phyllary size and margin, the medial, green, glandular-punctate portion of *L. savannensis* phyllaries is consistently raised above the hyaline border by a low, rounded ledge similar to that commonly seen in the large heads of *L. scariosa* (L.) Willd., which is perhaps closely related to ser. *Graminifoliae*.

Liatris graminifolia occurs over a wide area and in various habitats (especially northward), but meaningful infraspecific taxa are difficult to recognize, and comparisons to it in the present study refer to the species as a whole. Southern elements of *L. graminifolia* have phyllaries that are distinctly obovate to subspatulate, similar to those of *L. savannensis*, in contrast to oblong phyllaries, which are characteristic of plants from the northern part of the range of the species (roughly South Carolina and northward, see Fig. 3). The southern plants have been recognized as *L. graminifolia* var. *elegantula* (Greene) K. Schum. (the type from Alabama), but intergradation in phyllary morphology occurs over a wide area and oblong phyllaries are found even in some southern populations. Some descriptions of *L. graminifolia* have attributed more variability in vestiture and floret number to the species than we do, but it seems likely that these descriptions included the two species recognized and segregated for the first time in the present study.

A second previously undescribed species of *Liatris* has been recognized primarily on the basis of herbarium studies connected with preparation of a taxonomic treatment of the genus for the developing Flora of North America (FNA) volumes.

Liatris patens Nesom & Kral, sp. nov. (**Fig. 2, 3**). TYPE: UNITED STATES. GEORGIA. Laurens Co.: drier margins of wet sandy meadow 9 mi E of Dublin, 300 ft elev., 19 Oct 1947, A. Cronquist 4876 (HOLOTYPE: BRIT).

Liatris graminifoliae similis capitulis comparative grandibus et flosculis numerosis, differt pedunculis longioribus et caulibus ac pedunculis hirtelli-strigosis; *Liatris gracili* similis capitulis consistente peduncularibus et caulibus ac pedunculis pubescentibus, differt pedunculis longioribus et capitulis majoribus flosculis numerosioribus.

Plants perennial, arising from a globose to depressed-globose corm 7–14 mm in diameter. Stems stiffly erect, 35–95 cm tall; stems and peduncles moderately to densely hirtellous-strigose with antrorsely curved, ascending-appressed, multicellular white hairs 0.2–0.4 mm long. Leaves punctate-glandular, glabrous except sparsely ciliate along 1–5 mm of the proximal margins; basal and lower cauline narrowly oblanceolate to linear-oblanceolate, 9–18 cm long, narrowed to a petiolar portion 1/4–1/2 the leaf length, the broader (blade) portion 2–4(–

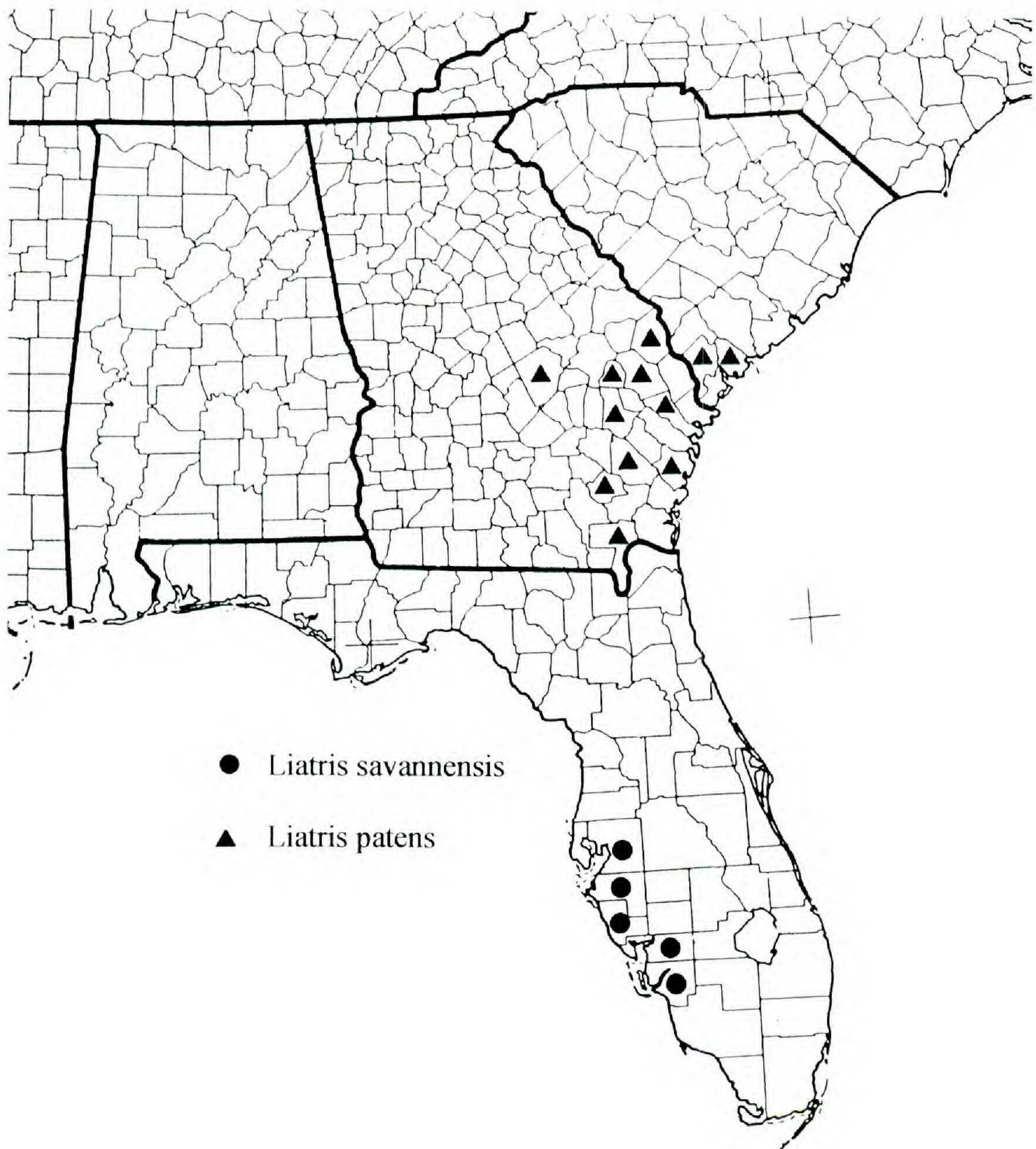


FIG. 3. Geographic distribution of *Liatris savannensis* and *Liatris patens*.

7) mm wide, gradually or abruptly becoming much shorter and linear, upper cauline 1–2 cm long, ca. 0.5 mm wide, grading into inflorescence bracts. Inflorescence racemose, determinate, forming a loose column (10, 20–)25–40 cm long, 3–6 cm wide. Heads erect or nearly so, on divergent-ascending peduncles 1–2.5(–3) cm long, peduncles initially diverging from the inflorescence axis at angles of 45–90 degrees, subtended by a linear bract 5–12 mm long, minutely subulate-bracteate, rarely (especially above damage and mostly on lower peduncles) 1–2-branched; involucres turbinate-campanulate, (5–)6–7.5 mm high, 5–7 mm wide (pressed); phyllaries in (2–)3–4(–5) series, strongly graduate in length, erect,

nearly flat, green with an evident midvein, broadly obovate to broadly oblong-obovate, apex rounded to nearly flat, innermost 1.5–2.5 mm wide, (5–)6–7.5 mm long, outermost mostly ovate, ca. 1/5–1/3 as long as the inner, all evenly punctate-glandular, outer sparsely strigose-villous with white hairs like those on the peduncles, inner glabrous, margins hyaline and pinkish-purple (like the corollas), 0.1–0.3 mm wide, even to slightly erose, usually densely ciliate. Florets 7–12; corollas pinkish-purple, sessile-glandular, tubular portion 4–5(–6) mm long, lobes 5, spreading, narrowly triangular, 2–2.5 mm long; internally pilose in the region of filament insertion with a broad annulus of whitish, crisped hairs. Achenes obtriangular in outline, slightly flattened, with ca. 10 nerves, 2.5–2.8 mm long, densely but weakly hirsute on nerves and intervals; pappus 5–6 mm long, usually equal or longer than the corolla tubes, bristles strongly barbellate, distally purplish.

Etymology and habitat.—The epithet “patens” alludes to the spreading, relatively long peduncles characteristic of the species. Collections have been made in sandy pinelands of southeastern Georgia and adjacent South Carolina, apparently mostly commonly in moist sites. Known collections have been made in late September through November.

Additional collections examined. **UNITED STATES. GEORGIA. Bryan Co.:** Fort Stewart Military Reservation, Training Area C18, N side of Fort Stewart Road 58, ca. 1.8 mi E of jct with Georgia Rte. 67; occasional on disturbed sandhill, 5 m elev., with *Vaccinium myrsinites*, *Quercus geminata*, 25 Sep 1992, Zebryk 672 (VDB). **Bulloch Co.:** 4.5 mi NW of Portal in open wooded area, 12 Oct 1962, Boole 1311 (BRIT, TEX, US). **Candler Co.:** sandy longleaf pineland above bog by hiway, ca. 3 mi NW of Aline, 9 Oct 1975, Kral 56936 (VDB). **Charlton Co.:** plentiful in open disturbed area [along] Ga 177, 13 mi NE of Edith, 8 Oct 1966, D’Arcy 1223 (VDB). **McIntosh Co.:** sandy flatwoods along US 17, near Middleton Church at Eulonia, 20 Oct 1987, Angerman s.n. (USCH); clearcut woods on north side of Eulonia, 20 Oct 1987, Angerman s.n. (USCH). **Pierce Co.:** sandy rise in pine flatwoods, 10 mi N of Bristol on Ga. 15, 11 Oct 1991, Kral 79978 (VDB); sandy pineland by US 301, S side of Jesup by Landmark Motel, 9 Oct 1975, Kral 59916 (VDB). **Screven Co.:** ca. 2 mi from Blue Springs near a “Carolina Bay,” 10 Oct 1959, Boole 997 (BRIT). **Tattnall Co.:** ca. 5 mi from Tattnall-Bryan County line on Route 280 from Claxton, 17 Oct 1959, Boole 1018 (BRIT). **Wayne Co.:** sandy peat of pine-palmetto flats, by US 341, 2 mi NW of Everett, 1 Oct 1976, Kral 59205 (VDB). **SOUTH CAROLINA. Beaufort Co.:** N of Victoria Bluffs Heritage Preserve, near Victoria Bluffs development, N of Rte. 278, N of Bluffton, local, along roadside through *Pinus palustris*/*Pinus elliottii*/*Serenoa repens* flatwoods on sandy spodosol soils, 4 Nov 2001, McMillan 6055 (CLEMS). **Jasper Co.:** UTM 498600 E, 358900 N, *Pinus palustris*/*Pteridium*/*Quercus pumila*/*Aristida* flatwoods combining elements of both mesic and dry areas, 10 Aug 1995, McMillan 1101b (USCH).

Collections of *Liatris patens* have previously been identified as *L. graminifolia* or *L. gracilis*, both of which appear to be sympatric with the new species (Fig. 3). The apparent geographical coherence of *L. patens*, recorded here for ten counties in Georgia and two in South Carolina, is matched by its morphological consistency. *Liatris patens* is similar to *L. gracilis* in its cauline and peduncular vestiture and its pedunculate heads, but the new species has larger heads with more numerous florets and the peduncles are longer and arch upward to bear

erect or nearly erect heads. *Liatris patens* is similar to *L. graminifolia* in its relatively large heads and number of florets but different in its hirtellous-strigose stems and peduncles and long-pedunculate heads in a broadly racemoid inflorescence. Peduncles of *L. graminifolia* often are slightly elongate (0–3(–7) mm), sometimes more in plants with damaged stems, but the peduncles are almost always straight and divergent at ca. 45 degrees.

Distinctions among *Liatris patens* and close relatives are summarized in the following contrasts.

1. Stems and peduncles glabrous or nearly so; heads usually sessile or on short (0–3(–7) mm) peduncles, usually in a densely spiciform arrangement; involucre 7–12 mm high; florets 6–14 per head. _____ ***Liatris graminifolia***
1. Stems and peduncles distinctly hirtellous-strigose with white hairs; heads on divergent, arcuate-ascending peduncles and loosely racemoid or nearly sessile but spreading; involucre (4–)5–7.5 mm high; florets 3–6(–7) or 7–12 per head.
 2. Peduncles (0–)2–10(–12) mm long, straight or slightly ascending; involucre cylindrical-campanulate, (4–)4.5–6(–7) mm high, 3–4(–5) mm wide; florets 3–6(–7) per head. _____ ***Liatris gracilis***
 2. Peduncles 10–25(–30) mm long, arching-ascending; involucre turbinate-campanulate, (5–)6–7.5 mm high, 5–7 mm wide; florets 7–12 per head. _____ ***Liatris patens***

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